BACKUS (The) ++++

Thos. F. Brooke Co.
[illegible] 15th Street, N. W.

...THE...

BACKUS

HEATER

643

MANUFACTURED EXCLUSIVELY BY

THE BACKUS MANUFACTURING CO.

PRINCIPAL OFFICE

104-106 SOUTH TENTH STREET

PHILADELPHIA, PA.

A Revolution in Heating

The Maximum of Heat, Cheerfulness, Economy, Cleanliness and Comfort, with the Minimum of Cost, Labor and Attention

The Backus Patent Steam Radiator and Heater

PORTABLE, OPEN, REFLECTING AND STEAM RADIATING

Utilizes every heat unit in the fuel. No Waste. No Odor. No Smoke. No Flues nor Chimneys. Possesses all the cheerfulness of the open grate and none of its disadvantages, and can be placed either in the ordinary fireplace, or in any position in any apartment.

GAS FOR FUEL AND A MATCH FOR KINDLING

The Backus Manufacturing Co.

Sole Manufacturers under License for the United States

The... Backus Heater

FOR SALE BY
The E. F. Brooks Co.
THE E. F. BROOKS CO.,
AGENTS,
CORCORAN BUILDING,
531 15th St. N.W. Wash'n, D. C.
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MANUFACTURED EXCLUSIVELY BY

The Backus Mfg. Co.

PRINCIPAL OFFICE

104-106 South Tenth Street

PHILADELPHIA, PA.

THE E. F. BROOKS CO.,
AGENTS,
CORCORAN BUILDING,
531 15th St. N. W., Washington, D. C.

What is the Backus Heater?

THE BACKUS HEATER is a miniature Steam Plant, combining in one piece a highly ornamental steam radiator, in the form of a mantelpiece or tiling to fit in an ordinary mantel and OPEN FIREPLACE, with logs. The upper log contains sufficient water when vaporized to fill the radiating surface surrounding it. The lower log is a peculiarly constructed burner, in which gas is consumed, making perfect combustion. The flame coming in contact with the boiler or upper log ignites the asbestos fibres on the same and produces the cheerful appearance of burning wood. The water at the same time changing from liquid to vapor spreads out the heat contained in the gas over the radiating surface as 1 is to 1700, which in turn communicates itself to the air coming in contact with the same. As there are neither inlet nor outlet pipes to the generator, the combustion of the gas is complete, and takes place entirely in the space to be heated, so there is no loss of the efficiency of the gas; all the heat units contained therein are set free within the space to be heated, and distributed by means of steam over the largest possible space without loss.

Efficiency.

Experiments and use of nearly 15,000 of these heaters in operation, show that one foot of steam radiating surface, when fuel is brought into the space to be heated and the steam generated within the space, is equal to 3 feet of steam radiating surface, when steam is made from a central locality and conducted to the space to be heated.

Cost of Heating.

Experiments have shown that in a properly constructed room, 14x16 feet, 15 feet of gas, 18 candle-power, will maintain a temperature of 70° in zero weather.

The expense of heating depends on size of room, construction, exposure, quality of gas and pressure of same.

It also depends on a number of variable conditions, such as the severity of the winter, the character of the climate, the temperature desired, etc.

Moreover, the expense of attendance and removal of ashes is entirely saved by the Backus system.

Economy and Why we can Compete with Coal.

The reason that by using *gas* with the Backus Heater we can compete with coal when the coal contains five times as many heat units as

the gas contains made from the coal is: To use coal requires a chimney connection and the combustion is made from a central locality and the heat conveyed is dissipated up the chimney through the air to the walls and ceiling before it reaches the space to be heated, and the loss in heat units when so used before it reaches the space to be heated more than counterbalances the difference in the heat value of the coal over the gas made from the coal. In the Backus the fuel is conveyed to the space to be heated and the combustion takes place within that space without loss, and the entire energy of the fuel is utilized by producing steam from a small quantity of water, and the expansion of the water from liquid to vapor, spreads out the heat contained in the gas as 1 is to 1700, and distributes this heat to the radiating surface above without one single heat unit being lost.

Again, in the old methods YOU MUST ADD TO THE COST OF COAL AND KINDLING :—

Expense of taking care of, and keeping in repair, Furnace or Steam Plant.

Cost and inconvenience of removing ashes, cleaning out of furnace and chimney by furnace man and chimney-sweep at regular intervals.

The great damage to furniture, carpets, and draperies would buy what Backus Heaters you need.

The great cost of starting up again in the spring when you thought you were through with the furnace nuisance; possibly this occurs four or five times, maybe ten.

It is often impossible to control and regulate the furnace at all times. You build a fire to warm a few rooms, and the result is unsatisfactory.

The furnace WEARS OUT. THE BACKUS—NEVER.

Healthfulness.

No system of heating can ultimately prevail that is not perfectly healthful. No amount of convenience and comfort will compensate for the loss of health. It is on this crucial point, therefore, that the manufacturers of the Backus Heater are ***Ready and Willing to Challenge the World.***

The reason why such an advanced position can be claimed and maintained for the Backus Heater lies in the fact that the products of combustion of ordinary illuminating or fuel gas consist almost entirely of water and an insignificant amount of carbonic acid gas, which is entirely harmless. The water of combustion and that evaporated from the open trough beneath the burner is taken up by the atmosphere in exact proportion to the temperature of the room, and whether it be 50° or 90° the hygrometric condition of the air is absolutely normal. This has been demonstrated over and over

again by means of a hygrometer [an instrument for measuring the amount of moisture in the air], whose indicator or needle, when the heater is running, stands at normal for hours at a time, the greatest variation observed never being more than four or five degrees on either side of the zero point.

The enormous increase of catarrhal and nasal troubles in this country during the last thirty years can only be accounted for from the baneful and deleterious effect *of furnace- or steam-heated houses.* Nature remedies this defect in an ingenious manner, for in summer the capacity of the air to hold moisture increases, *paris passu,* with the temperature of the air. The dry and unnatural air produced by hot-air furnaces undoubtedly has an injurious effect on the delicate mucous membranes of the throat and lungs, irritating and inflaming them in such a way as to make them unduly susceptible to the natural air outside of the house, thus increasing the liability of catching colds, with their attendant evils, that soon become chronic.

The following example of the products of combustion of 1,000 feet of ordinary illuminating gas will show conclusively the insignificant amount of carbonic acid gas which is produced.

1 lb. of carbon produces 3.66 lbs. carbonic acid gas.

1 lb. average best American coal gas, or 31 cubic feet, contains about 0.34 lbs. carbon.

0.34 lbs. carbon produces 1.24 lbs. carbonic acid gas.

1 lb. carbonic acid equals 8.59 cubic feet.

1.24 lbs. carbonic acid equals 10.65 cubic feet.

1 cubic foot illuminating gas therefore produces 0.34 cubic feet carbonic acid gas.

Since the maximum amount of gas a radiator consumes never exceeds 25 cubic feet per hour, the maximum amount of carbonic acid which could be produced per hour would be 8.5 cubic feet, and for six hours, 51 cubic feet, or in a room 20 x 20 x 12 say 5000 cubic feet, only 1 per cent., which, of course, is negligible. As a matter of fact we have never been able to find in a normally heated room as much as half of 1 per cent.

Artistic and Ornamental Appearance.

One of the special and invaluable features of the Backus Heater is the highly artistic and ornamental effects that can be produced by their universal introduction. No single piece of furniture or ornamentation that might be added to a room could be as effective as the introduction of one of these Heaters.

The Heaters are designed to meet the most varied requirements of all stages of social life, and are made to vary from the plainest forms to the

richest and most highly ornamental designs which it is possible for the artist and metal worker to conceive and execute, so that they are at once capable of being used in the humblest apartment as well as within the walls of a palace. They can be had in all shapes and colors, toned or shaded to suit every variety of taste, and harmonize with the surroundings in the apartment.

Advantages.

The present methods of heating, with their thousand objectionable features, entailing unnecessary labor and annoyances, and yet failing to accomplish the desired results, must be relegated to the shades of barbarism and a lower form of civilization, when we consider the advantages of the only complete, perfect and really scientific system of heating ever devised. They may be briefly stated as follows:

Health, Economy,
Efficiency, Adaptability.

The Heaters are adapted for heating any kind of an apartment, and are invaluable in a large hotel or apartment house, where it may be necessary to heat only a few rooms for a few hours at a time.

You can have a fire at such a time with a Backus at a less cost than the kindling used in a fireplace or stove or furnace.

Uniform Temperature.

How Do We Know This?

Because four thermometers on the four walls of a room where a Backus Heater is burning will register the same.

This fact means one part of the room is as warm as any other.

This fact means you don't roast your face and freeze your back.

This fact means there must be a circulation of air in the room.

And a circulation of air in the room means life to the air.

Purification of the Air.

Dust particles, microbes and all impurities in the air of the room are consumed. By a peculiar arrangement a continuous current of all the air is made to pass through the flames, not only once, but many times, thus burning all impurities.

How Do We Know This?

Because the odor of tobacco is dissipated after smoking in a room with a heater.

There is no odor in the room shortly after an onion poultice has been prepared therein.

Lithium salts scattered in the air of a room, 16 feet from the burner, are indicated in the flame in 1½ minutes, and 30 feet from burner in 3⅓ minutes.

A pure atmosphere in normal hygrometric condition.

How Do We Know This?

Because the hygrometer, the instrument for measuring and recording amount of moisture in the air, will record *Normal.*

The proper amount of moisture for good health being in the room we get rid of the dry and dusty heat which tends to produce and aggravate catarrh of the throat and respiratory organs and which is so productive of headaches.

STOP! Read "Purification of Air" and "Pure Atmosphere" again and again, and so impress it upon your memory that you will never forget. Then read the following from *The New York Herald*, and you will realize in all its grandeur what we are doing for the betterment of the world. When *we say the dust particles, microbes and impurities are destroyed by the Backus Heater, and again when we say we produce a soft, moist atmosphere with the Backus Heater.*

LIFE LOST FOR SCIENCE.

Dr. John M. Byron a Victim to His Own Experiments.

THE BACILLI OF CONSUMPTION.

He Inhaled Dry Bacteria and in Fifteen Days was Beyond Hope—An Extraordinary Case Demonstrating the Dangers to which Scientific Men are Exposed.

(*New York Herald, May 15th, 1895.*)

Dr. John M. Byron died in the New York Hospital yesterday of consumption—a disease that he believed he contracted through his bacteriological experiments. Although only 35 years old, he was acknowledged to be one of the most eminent bacteriologists this side of the Atlantic

His own explanation of the manner in which he contracted the disease was given in the *Herald* in November, as follows:

"I have been making culture of disease germs for twelve years, and I suppose familiarity with them made me careless, just as a surgeon frequently cuts himself with his knife. You know it was our custom to get the sputum of patients in the hospitals suffering from consumption and to find this bacteria. These are generally

confined in bottles or tubes when not in use, but when we want to put them under the microscope they are spread out on the glass.

INHALED DRY BACTERIA.

"Small as they are, they are very hard to kill, clinging to life with far more tenacity than their victims. *One is practically safe as long as they are wet*, but when they become dry they fill the air as so much dust, and you cannot help but inhale them. It is in this way, you know, that consumption spreads.

"I was somewhat run down last February—in fact, I had never become very strong after my exposure during the cholera scare. I was doing some experimenting with tuberculosis bacteria at the time, *and I suppose that some of them had been allowed to dry—how I don't know*—but it may be that some were brushed to the floor during our researches, or that the bottles were not thoroughly sterilized, or in any of the thousand and one ways in which carelessness may exhibit itself."

Dr. Byron said he began to feel weak fifteen days afterward, and he made an examination and found that he had consumption. Both his lungs were badly affected, but, while he knew there was no cure, he hoped to live for some time. He was recently appointed bacteriologist to the quarantine department by Health Officer of the Port, Alvah H. Doty. He leaves a widow and two children.

"While his death is to be lamented as a great loss to science, it proves the importance of using every precaution in our power to keep the air we breathe free from organic impurities, exhalation from the lungs and skin."

No Loss of Heat.

A Backus Heater Does Not Waste One Unit of Heat; All is Utilized.

How Do We Know This?

The heat is not carried from a central point to the different rooms of the house. In the Backus Heater the *fuel* is *conveyed* to the space to be heated and the combustion takes place within that space without loss and the entire energy of the fuel is utilized by producing steam from a small quantity of water, and the expansion of the water from liquid to vapor, spreads out the heat contained in the gas as 1 is to 1,700 and distributes this heat to the radiating surface above without one single heat unit being lost.

Among the advantages that the Backus Heater possesses over other heaters may be mentioned:

Safety.—No danger from defective flues.

The use of gas for fuel.

Cleanliness and convenience.

Freedom from dust and ashes.

The combination of open fireplace and steam heat.

Ornamental appearance.

The combination of a heater and mantel.

Moderate prices, according to degree of ornamentation and decoration.

The ability to dispense with chimneys and flues in a house or room.

Ease of operating and manipulating. The Heaters can be operated by a child, with a match for kindling.

Perfection of control and regulation of the temperature.

Possibility of heating one or more rooms without the expense and waste of heating the entire house.

Economy in construction of new houses; no fireplaces, flues or chimneys being required.

Is always ready.

In a word, it combines the advantages of all other methods with none of their defects.

Savings in New Buildings.

Read carefully, as these are large and important savings.

No *chimneys* or *flues* are required.

How much does this save?

You can have a Backus Heater for one-half the cost of a chimney.

You need no tiling for hearth.

You need no tiling for face of mantel.

You need no trimmer.

A Backus forms its own hearth and facing and requires no trimmer.

You need not pay for Fire-brick backs,

Jambs, Cement, Ash dumps, Dampers,

Brass frames, Grate, or Labor.

How much does this save?

Another Backus Heater.

You need not buy Andirons or Fenders; they are furnished with every Backus Heater.

How much does this save?

Price of Heaters.

The price of heaters depends on the size, and amount of artistic and ornamental work required in their manufacture. Our price includes the tiling, radiator, andirons, fender, hearth, back, jambs, in fact a complete open fire which can be placed either in mantel now in place or forms its own mantel.

Backus Heaters vs. Gas Grates, Gas Stoves, Gas Logs etc.

A Backus Heater will save ***the price of the Heater*** every year over any other made by the smaller amount of gas required for heating purposes and possesses the advantages heretofore mentioned.

Backus Heaters vs. Furnace.

In new buildings you can fit up with mantels and Backus Heaters and save 20 per cent. over the ordinary way of putting in furnace and mantels, for the reason that the mantels require back and jambs, chimneys, tiling and hearth, andirons and fenders, all of which are included in and form a part of the price of the Backus Heater. If you already have a good furnace in you should only use your furnace in the most careful manner. In very cold weather run it no harder than in moderate weather, but add what extra heat is needed from a few Backus Heaters. Then two months of fall and two months of spring you don't need a furnace. The Backus Heaters are just what you want for this purpose, since the furnace is either too hot or too cold, but with Backus Heaters the temperature is under such easy control that the furnace fire is put out to be used during December and January only of the next year. To run the furnace too hard and ask too much of it is expensive and unhealthy. Because the furnace when run this way, at full blast, gets red hot, thus burning out the furnace and necessitating repairs, and at the same time sending a superheated dry air into the room, thus aggravating catarrh of the throat and respiratory organs.

It also allows easy access of carbon monoxide (product of imperfect combustion) along with the air.

The air entering the room is filled with dust particles that ruin carpets, draperies, furniture, and everything with which it comes in contact.

In addition to the impurities mentioned above, the organic vapors and impurities from the lungs and skin are inhaled over and over again. Some settle to the floor and are again diffused by dusting, sweeping, etc., to be rebreathed over and over again.

It is almost impossible to get free distribution of heated air at points most exposed to the cold, *i.e.* exterior surfaces.

It often happens that the flow of hot air through certain ducts most essential to uniformity of temperature, is feeble and totally inadequate, *because* the point of distribution is somewhat remote from the furnace.

There are times when owing to prevailing winds outside, it is found impossible to force a current of warm air into certain parts of the building.

The pipes conveying the heat to the registers radiate and waste a large percentage of heat.

There is an additional fire risk by reason of the pipes passing between partitions.

Backus Heaters vs. Hot Water and Steam.

This system is better than a furnace, but the air is stagnant and the organic vapors and impurities from the lungs and skin are rebreathed just the same.

In some respects, however, this system is not so good as the Furnace system ; while many of the objections to the latter system noted above still remain.

Backus Heaters vs. Stoves.

The stove is not as wasteful of fuel as the grate, but in other respects is as objectionable as the grate.

The disadvantages of stoves are evident to every one. The poorest excuse for their use is too good. They are economical it is true, and when you say this you have said all. A list of disadvantages would fill a book.

In a word a stove has all the disadvantages of every other system and none of their advantages.

A Backus has all the advantages of all other systems with none of their disadvantages.

Backus Heaters vs. Fireplace.

The disadvantages of a common fireplace are :

Open grates waste from 75 to 90 per cent. of the fuel they consume.

They are difficult to regulate.

Are productive of dust and dirt.

Require much labor and attention.

They do not nor cannot be made to diffuse heat with uniformity throughout a single room, to say nothing of an entire building.

An open fireplace "can draw in only from the bottom of the rooms, where generally the coolest, the last entered and therefore, the purest air is found; while the hotter air of the breath, of warm food and often of subterranean drains, damp cellars, etc., rises and is stagnate near the ceiling and gradually corrupts there. Such heated impure air no more tends downward again to escape or dive under the chimney-piece than oil in an inverted bottle will dive down through water to escape by the bottle's mouth."

A top window sash lowered a little becomes generally in obedience to the chimney draught merely an inlet for cold air, which first falls as a cascade to the floor and then glides toward the chimney and gradually passes away by this, leaving the hotter impure air of the room nearly untouched.

Lastly, it produces draughts in a room which is against the foundation principle of ventilation.

An essential condition to ventilation is a gentle and equable movement in the air, sufficient to produce entire and complete displacement, but not sufficient to create any perceptible current.

Can you say this of the fireplace ? We can say this of the Backus Heater.

Testimonials.

The questions discussed herein, as to the efficiency economy and healthfulness of the Backus Heaters considered from a merely abstract point of view, *would only influence those who would take the trouble to reason out for themselves the truth of such statements.* There is only one conclusion to draw, however, when these questions are answered directly by thousands who have lived with the Heater in practical daily operation for a year or more, and whose statements and opinions (many of them entirely unsolicited) *constitute the most remarkable testimonials that have been bestowed on any invention in modern times—and that is that the Backus Heater is destined to accomplish the most remarkable revolution in domestic economy of any invention of the age. Its application is universal, and its possibilities inconceivable. Every house on earth, be it a cottage or a palace, inhabited by civilized human beings, needs one or more Backus Heaters.*

We copy a few of the Testimonials which show the economy and sanitary effect of using Backus Heaters:

Professor W. C. Tilden's Report on the "Backus" Patent Heater.

NEW YORK CITY, Dec. 1, '86.

Q. S. BACKUS, ESQ., Williamsport, Pa.

Dear Sir :—One of your Heaters, consuming ordinary illuminating gas, was placed in a room in this city, and I was instructed to ascertain the effect of its use upon the atmosphere of the room. The results show that the

Heater is effective, healthful and economical, as appears from the following:

Dimensions of apartment, 15 x 15 x 9—2025 cubic feet. Number of windows, 2; doors, 1.

This room was closed during the experiment, that is, for five hours, during which time the Heater was continuously burned. Temperature, 92° F. first hour: 94° F. second hour; 95° F. third hour; 95° F. fourth hour; 95° F. fifth hour. Air was taken by an aspirator from the centre of the room, and tested from time to time to ascertain the quantities of products of combustion. The process employed for carbonic acid was a modification of Petenkofer's method, using baric hydrate of known strength, and titrating back by 1-10 normal hydrochloric acid. In this closed apartment the highest results for carbonic acid gas obtained was 7.60—100 volumes per 1000 cubic feet of air space. Carbonic oxide was not present. Combustion by your mechanical device is almost as perfect as theory demands. I find that the small amount of carbonic acid gas obtained in this severe test is due to the extraordinary mechanical perfection of your device, by which all the heat is utilized with a minimum of waste products of combustion. You use 94 per cent. of air and 6 per cent. of burning gas. You thus greatly intensify the heat evolved, which is applied with the least possible loss by connection or conduction to the production of steam. Every cubic inch of water used in your apparatus is capable of conversion into over 1600 times its original volume. The vapor of water thus generated at the pressure indicated (60 mm.) transfers its available heat to the enclosing metal. Atmospheric air, coming in contact with a metallic surface thus heated (with no contact of flame), is readily raised to a temperature almost equal to that of the radiating surface.

From any point of view, as regards sanitary considerations, this method of heating apartments is thus seen to be both safe and economical. It is also certain that

human health will be conserved by its employment rather than by any of the older and cruder processes.

You have inaugurated a new departure in not only obtaining a practically perfect combustion by reburning first products, but also by disseminating the heat over a large radiating surface by means of steam, which by former methods has been lost by exhaust through the chimney.

W. C. TILDEN, A. M. D., Ph. D.

Late Chemist U. S. Treasury Department; late Professor of Chemistry, Medical Department, Georgetown University; late Professor of Chemistry, Harvard University; late Chemist Commissioner, Agricultural Export Station, etc.

Extract from

Dr. Seneca Egbert's Report.

Prof. of Hygiene, Medico-Chirurgical College, Phila., Pa.

Lecturer on Hygiene at Drexel Institute, Philadelphia.

The Volatile Organic Matter from the Lungs, the real substance that produces the harmful effects in those breathing respired air, must be either destroyed, removed or diluted below the limit of respiratory impurity.

To get Rid of Organic Impurities by ventilation is very difficult. "Diluting the air of a room *does not dilute the individual bacterium or spore.*" Most of them are heavier than air and have a tendency to adhere to dust, and settle where dust settles, and be diffused by whatever diffuses dust in the air, such as dusting and sweeping, etc.

Dr. Egbert says: The question here arises, *Why Not Use Fire and Heat* to purify the air we breathe, provided we can devise any safe means of doing so? As sanitarians, we look upon these agents, in all functions and habits of life, *as being the very best to destroy organic impurities, whether living or dead*, and we make use of them whenever we can. So far as I know the inventor of this heater is unique in attempting the purification by fire of the air of ordinary dwellings, and I *believe his idea threatens to revolutionize our present notions concerning the heating and ventilating of houses.* Moreover, whatever organic impurities are carried through the Bunsen flame will be completely oxidized by the intense heat.

The Presence of Lithium Salts scattered in the air sixteen feet from the burner was indicated in the flame in one minute and a half; so with sodium and potassium salts, *doors and windows being closed to exclude other currents than those of the burner itself. This certainly shows a good circulation of air in the room.*

The Odor of Tobacco is quickly dissipated after smoking, and I have noticed that *there was no odor in a room within a few minutes after an onion poultice had been prepared therein.* CAN WE SAY AS MUCH FOR THE ORDINARY SYSTEMS OF VENTILATION WITH WHICH WE ARE ACQUAINTED?

Extract from a Report Made by John B. Garvin, B. S., Professor of Chemistry, Denver, Colorado,

Professor Garvin also has made a test of the Heaters and he says: *The Chief Noxious Agent* is the organic matter exhaled from the lungs and skin, or formed

through decomposition, and this should be our chief concern in this investigation.

The Organic Vapors waste particles of epithelium and fatty matter given off by the lungs and skin are highly injurious when present in large quantities, and being less diffusable than other constituents of air accumulate to a sickening degree in the atmosphere of living rooms.

How Properly to Free Apartments of this fœtid compound without creating a dangerous draught, has long been an architectural problem.

It would appear from the results of the experiment under consideration that *your heater serves as a sort of crematory of floating organic debris, creating a circulation by which every particle of air in the room is brought within the purifying influence of the Bunsen flame.*

Albuminoid Ammonia Expected to Find. Under ordinary circumstances I should have expected to find the albuminoid ammonia in this room increased by one-half or even greater proportion.

The Decrease by Oxidation. I can satisfactorily account for this decrease only by supposing that your Heater is the destructive agent, and that it acts as stated above, that is, by drawing into the Bunsen flame and completely oxidizing the noxious vapors and floating particles in the air.

Hygrometric Condition of the Air. The hygrometic condition of the air in the room, not only on the occasion of this experiment, but on many others, as indicated by a close observation of the hygrometer, was that found to be most agreeable to the majority of the people, the desirable relative humidity ranging .60 per cent to .75 per cent.

Humidity Due to the Water-Pan. This humidity was due in part to exhalation of the persons present, in part to combustion of the gas, but mainly to vaporization of the water in the water-pan of the Heater. This I regard as one of the important features of your invention.

Other Heating Appliances. Although many sorts of heating appliances have been devised, nearly all are open to the objection that they render the air of a room oppressively dry.

Some Results of Dry Heating Appliances. Artificial climates are thus created within our houses, and it is not surprising that the radical change to the outer and more humid atmosphere often results in the contraction of such diseases as pneumonia, bronchitis and phthisis pulmonalis, to which a very large percentage of mortality is due.

Conclusion. In conclusion, I have no hesitancy in saying that your Heater is capable of doing all or more than you claim for it; that it is safe, efficient, healthful and economical, and in every respect the most desirable heating apparatus that has come within my knowledge.

Very respectfully yours,

JOHN B. GARVIN.

New York Fire Insurance Company,

72 Wall Street.

Organized, 1852. Cash Capital, $200,000.

New York, June 5, 1894.

Backus Mfg. Co.

Dear Sirs: In reply to the inquiry regarding your heaters, we would say that you have solved the problem of heating our building, No. 72 Wall street, for us. We have tried grate fires with the usual amount of dust, dirt and discomfort. Then we put in steam, which, however, was very unsatisfactory. Last September we adopted your system, and we are glad to say it has been far more satisfactory than either of the others. We have all the heat we require at a very short notice, and of the most wholesome character, and each room is entirely independent of the other.

As to expense, while it runs higher than the cost of steam with gas at $1.25 per thousand cubic feet, with gas reduced to $1.00 per thousand cubic feet it would be entirely satisfactory.

We would not change back to steam even at the present cost of gas. In short, your claims for your system of heating are practically demonstrated to our full satisfaction, and it gives us pleasure to recommend it.

Yours truly,

(Signed) Chas. A. Hull, V. P. and Treas.

134 S. 9th Street, Philadelphia, July 24, 1895.

The Backus Mfg. Co.,

Dear Sirs: In reply to your favor asking my opinion as to the comparative cost of heating my house, 1738 N. 15th St., Philadelphia, for four years with your heater as against coal used with hot air furnaces, it is my opinion

and experience that with gas at $1.00 per thousand feet, it cost no more than coal; and this without taking into consideration the trouble and annoyance of taking care of a furnace fire, with its attending dust and destruction of furniture, carpets, etc. The Backus heater is clean, efficient, economical and healthy. I have used them, six in number, in my house for four years, and heated my whole house with them, and can find no complaint to make against them. In my opinion heating by gas, through Backus Heaters, is the coming system of heating, and is as much in advance over heating by coal as electric lighting is over tallow dips.

Yours very truly,

(Signed) F. F. BRIGHTLY.

[Copy of letter received from W. H. Frost, Pres. of the Fort Scott Gas Company, Fort Scott, Kansas.]

FORT SCOTT, Kan., Feb. 1, 1895.

MR. Q. S. BACKUS,

106 South 10th Street, Philadelphia, Pa.

Dear Sir: In reply to your favor of recent date relating to the Backus Heaters in use in Fort Scott, would say: They have all worked satisfactorily during the past winter, and we have had the coldest winter in twenty years. I have heated my own and several other houses throughout with your heaters.

It is my candid opinion that you have the only Heater on the market to-day that will successfully compete with anthracite coal.

I consider heating by gas, using Backus Heaters, the most convenient, economical, and healthful way known.

Yours very truly,

(Signed) W. H. FROST.

[Copy of a letter received from F. E. Warren, Ex-U. S. Senator and Ex-Governor, and U. S. Senator elect from Wyoming:]

UNITED STATES SENATE,
Washington, D. C., July 26, 1895.

MR. Q. S. BACKUS,
106 South Tenth Street, Philada., Pa.

Dear Sir: Your favor of recent date, forwarded to me from Cheyenne, duly received and noted. In reply to your inquiry as to my experience with the Backus Heaters, would say that we placed one hundred and thirty heaters in Cheyenne, Wyoming, last fall and winter in residences, stores, public buildings, etc., and notwithstanding the fact that last winter was the coldest in twenty years, the heaters stood the severe test and gave satisfaction. I heated my own house altogether with them, and while during the severest weather it costs a little more to heat with gas than coal, yet, taking the season through, the average cost is very little if any more, and the freedom from trouble of attending coal fires is a great advantage. We have found them so efficient, cleanly and healthful, that we will introduce them into our Washington home before taking possession next fall.

I am an officer and owner in both gas works and electric light plants, and from that standpoint I consider the Backus Heater the most important discovery, so far as the consumption of gas is concerned, that has been made since gas was first introduced for lighting, and their introduction removes much of the cause of rivalry existing between gas and electric lighting companies, because they can give gas companies a very greatly increased output.

For extra fires in all climates, and for entire house heating in warmer climates, the Backus Gas Heater is

cheaper than coal and saves much work, with the benefits of cleanliness and convenience thrown in.

It would take over twenty-five thousand heaters to supply New York the first year if as many in proportion were placed there as in Cheyenne during a like period of time.

Very truly yours,

(Signed) F. E. WARREN.

[Copy of a letter received from A. H. Branch, Secretary and Treasurer and General Manager of the Denver Consolidated Gas Company.]

JAMES B. GRANT, Pres. GEORGE COPPELL, V. Pres.

A. H. BRANCH, Sec., Treas., and Gen. Manager.

THE DENVER CONSOLIDATED GAS COMPANY,

515 17th Street, Denver, Colo., May 20, 1895.

THE BACKUS MFG. CO.

Williamsport, Pa.

Gentlemen: The Backus Heating Company of our city have placed three hundred and fourteen of your heaters since September 1, 1894, all of which have given the utmost satisfaction.

The heaters have been used during the heating season, October 1 to May 1, seven months.

Many of our most prominent physicians are using them, and speak in the highest terms of their healthfulness.

I have heated my home with them, and, while the winter just passed has been the severest we have had in Colorado for the past twenty-five years, we have had the most uni-

form heat in our home we have ever had, with no trouble of operation and freedom from dirt.

Am satisfied that by January 1, 1896, the Heating Company will have six hundred heaters in use, and as the people become educated in their use and benefits, the majority of our homes will use them.

Yours very truly,

(Signed) A. H. BRANCH,

Sec., Treas., and Gen. Mangr.

Doctors and Chemists. What they Say of the Backus Heater.

"In conclusion, I have no hesitancy in saying that your heater is capable of doing all or more than you claim for it; that it is safe, efficient, healthful and economical, and in every respect the most desirable heating apparatus that has come within my knowledge."

You can spare three Minutes and get at the Kernel without a Mass of Reading.

"To my mind it typifies the trinity of earthly happiness, viz: Beauty, Comfort and Economy."

"There is neither smoke, dust, gas nor any obnoxious odors."

"From a practical and hygienic standpoint you have the most perfect heating apparatus of which I have any knowledge."

"The results show that the Heater is effective, healthful and economical."

"From any point of view, as regards sanitary considerations, this method of heating is both safe and economical."

"Human health will be conserved by its employment rather than by any of the older and cruder processes."

"You have inaugurated a new departure in not only obtaining a practically perfect combustion by reburning first products, but also by disseminating the heat over a large radiating surface by means of steam."

"I have investigated the construction and the quality of the atmosphere, and am satisfied from a sanitary point that you give the most pure and natural atmosphere of any system of heating known."

"It is nature's principle. Far from being injurious to health, it will conduce to give healthy atmosphere."

"It gives back the moisture which naturally belongs to pure air but which other systems take out."

"I can and will recommend it for all sick rooms on account of its hygienic qualities."

"You have the most scientific and natural way of heating yet known, without saying anything about its convenient and ornamental construction."

"I am so well pleased that were you to offer to remove it and put in its place a coal burner and furnish fuel free of charge I would positively refuse your kindness."

"Ventilation may be as perfect, air as pure and heat as moist as from any known process of heating, and more than from the usual methods now in use."

"The feature about them which I emphasize is the absence of any odor in the apartments heated."

"There has been no odors and the amount of gas burned astonishingly small."

"I have found it thoroughly efficient as regards heating power. From a sanitary standpoint it seems perfect, the warmth being healthful and free from usual dry heat from furnace, stoves or hot apparatus."

"I can warmly recommend it to anyone desiring a powerful, economical, healthful and convenient method of heating."

"I predict that yours is the coming system of heating."

"I think it is the best, most cheerful and cheapest heater I have yet seen. I heartily recommend it."

"I can cheerfully state it is a heater 'per se' (par excellence) for maintaining a uniform temperature in the sick room or hospital."

"It warmed my room as it had never been warmed before in extreme cold weather, and rendered the temperature of the whole floor more equable."

Following are Miscellaneous.

"I would not have them removed now for $1000 if I could not replace them with others."

"The radiation from the steam and vapor pan gives an atmosphere that is balmy and healthful."

"They are ornamental, cleanly and labor-saving."

"Many people conflict an ordinary heater for gas with your heater. There is really no comparison. There is as much difference as night from day."

"It costs me about 1½ cents an hour."

"As compared with the cost and discomfort of a coal fire in open grate or stove I could not patiently enter into

an argument. Gratitude will compel me to show it in operation to your friends or mine."

"It is the cleanest, most economical and most practical heater for parlors I have yet seen."

"Always ready to light and can be turned off in a twinkle; free from dust, requiring no carrying in of coal and no ashes to carry out."

"It will never go out of my office. From a healthful and efficient standpoint, I consider it the best system of heating now in use."

"They embrace all the advantages of all other systems without their disadvantages."

"For the home, for the hospital, for the hut and for the palace, it has no equal."

Fifteen thousand heaters in daily use is convincing proof of their value. We will cheerfully give references and full information on application.

The BACKUS MANUFACTURING CO.

SOLE MANUFACTURERS UNDER LICENSE FOR THE UNITED STATES OF THE

BACKUS PATENT PORTABLE STEAM RADIATORS

FOR GASEOUS FUEL, RADIATING MANTELS, TILES, OPEN FIREPLACES, GAS LOGS, ETC.

Under Letters Patent granted to Q. S. Backus, as follows:

Jan. 19, 1886, No. 334,504	June 29, 1886, No. 344,512
June 29, 1886, No. 344,511	June 20, 1886, No. 344,513
Dec. 6, 1887, No. 374,333	Dec. 13, 1887, No. 274,649
Oct. 9, 1888, No. 390,743	Oct. 5, 1892, No. 485,078

And other patents applied for.

UNITED STATES FACTORY:

WILLIAMSPORT, PA.

The Backus Manufacturing Co. has established the following companies for the exclusive sale of Heaters in their respective localities:

THE BACKUS GAS HEATER AND FIXTURE CO., ST. LOUIS, MO.
1012 Olive Street.

Backus Heating Co., Denver, Colo.
515 17th Street.

Backus Fuel Appliance Co., Colorado Springs, Colo.

Backus Heater Co., Kansas City, Mo.
1019 Walnut Street.

Backus Gas Heating Co., Columbus, Ohio.
135 N. Front Street.

Backus Heating and Gas Appliance Co., Grand Rapids, Mich.
109 Ottawa Street.

Backus Heating Co.,
Wisconsin and East Water Sts., Milwaukee, Wis.

Backus Mfg. Co.,
160 Tremont St., Boston, Mass.

Backus Mfg. Co.,
Factory, Williamsport, Pa.

Backus Heating Co.,
131 N. Queen St., Lancaster, Pa.

BACKUS MFG. CO.,
Principal Office, 104-106 S. 10th St., Philadelphia, Pa.